Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently amended)　　A computer program product on a computer-readable medium for designing a set of experiments, the program comprising instructions operable to cause a programmable processor to:

~~define~~ receive input defining a set of experimental parameters, one or more sampling patterns defining a sampling for each parameter of the set of experimental parameters, and one or more constraints limiting the set of experiments to a particular volume or volumes of a hyperspace defined by the set of experimental parameters, at least a plurality of the set of parameters being grouped according to a parameter type such that the grouped parameters are constrained to perform a common role in the set of experiments;

generate a first estimate of the practicability of a first set of experiments defined by the parameters, the sampling patterns and the constraints, the first estimate including a count of the set of experiments defined by the set of experimental parameters, the sampling patterns ~~sets of values~~ and the constraints, and provide the first estimate to a user;

receive ~~an~~ input modifying at least one of the set of parameters, the sampling patterns or the constraints in response to the first estimate;

in response to the ~~an~~ input modifying at least one of the set of parameters, the sampling patterns or the constraints, generate a second estimate of the practicability of ~~the~~ a second set of experiments defined by the set of experimental parameters defined by the parameters, the sampling patterns and the constraints, including the modified parameters, sampling patterns or constraints, the second estimate including a count of the second set of experiments, and provide the second estimate to the user; and

in response to ~~an~~ input approving of the second estimate, generate an experiment design defined by the parameters, the sampling patterns and the constraints, the experiment design

including <u>data representing</u> a final set of experiments, <u>the data including a plurality of sets of</u> <u>coordinates in the hyperspace defined by the set of experimental parameters, each of the sets of</u> <u>coordinates defining an experiment in the final set of experiments.</u>

2. (Cancelled)

3. (Currently Amended)   The computer program product of claim 2 <u>1</u>, wherein:

the sampling patterns include at least a first sampling pattern defined for a first parameter of the set of experimental parameters and a second sampling pattern defined for a second parameter of the set of experimental parameters, wherein the first sampling pattern is different from the second sampling pattern.

4. (Original) The computer program product of claim 3, wherein:

at least one of the first and second sampling patterns includes a gradient of parameter values defined by a minimum parameter value, a maximum parameter value and a step size.

5. (Original) The computer program product of claim 4, wherein:

the first and second sampling patterns are defined by first and second gradients.

6. (Currently Amended)   The computer program product of claim 2 <u>1</u>, wherein:

the set of experimental parameters includes a plurality of component materials to be used in the set of experiments.

7. (Original) The computer program product of claim 6, wherein:

the set of experimental parameters includes at least one process condition to be varied in the set of experiments.

8. (Original) The computer program product of claim 6, wherein:

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the constraints include a mixture constraint limiting the fractional contribution of at least a plurality of the component materials to a total composition in one or more of the experiments in the set of experiments.

9. (Original) The computer program product of claim 8, wherein:

the mixture constraint specifies a minimum number of component materials to be included in one or more of the experiments in the set of experiments.

10. (Original) The computer program product of claim 9, wherein:

the mixture constraint specifies a maximum number of component materials to be included in one or more of the experiments in the set of experiments.

11. (Original) The computer program product of claim 6, wherein:

the constraints include a type constraint limiting the total number of parameters of a specified type to be included in one or more of the experiments in the set of experiments.

12. (Original) The computer program product of claim 6, wherein:

the constraints include a sum constraint limiting the sum of a contribution of parameters of a specified type to one or more of the experiments in the set of experiments.

13. (Original) The computer program of claim 6, wherein:

the constraints include a balance constraint limiting the contribution of at least one parameter to a plurality of experiments of the set of experiments based on the contribution of one or more other parameters to one or more of the experiments in the set of experiments.

14. (Original) The computer program product of claim 6, wherein:

the constraints include a list constraint identifying a list of one or more starting compositions to be used to generate the set of experiments.

15. (Original) The computer program product of claim 14, wherein:

      each of the starting compositions is represented as a point in the hyperspace defined by the set of experimental parameters; and

      the list constraint specifies a distance criterion specifying an acceptable distance in the hyperspace from the points corresponding to the starting compositions.

16. (Original) The computer program product of claim 14, wherein:

      the one or more starting compositions are derived from results of a previous experiment.

17. (Original) The computer program product of claim 6, wherein:

      the constraints include a synthesis constraint specifying an order in which a plurality of component materials are to be added in a synthesis to be performed in one or more of the experiments in the set of experiments.

18. (Original) The computer program product of claim 17, wherein:

      the synthesis constraint specifies that the order in which component materials are to be added is to vary between a plurality of experiments in the set of experiments.

19. (Original) The computer program product of claim 6, wherein:

      the constraints include a process constraint specifying an order in which a plurality of process steps are to be performed in one or more of the experiments in the set of experiments.

20. (Original) The computer program product of claim 19, wherein:

      the process constraint specifies that the order in which process steps are to be performed is to vary between a plurality of experiments in the set of experiments.

21. (Currently Amended)   The computer program product of claim 2 1, wherein:

      the constraints include a project constraint specifying the order in which individual experiments in the set of experiments are to be performed.

22. (Original) The computer program product of claim 21, wherein:

the project constraint includes a priority value assigned to one or more of the set of experiment parameters, the priority value representing a relative priority attached to the corresponding parameter.

23. (Currently Amended)   The computer program product of claim 6, wherein:

the constraints include one or more chemistry-specific constraints selected from ~~the group including~~ balance constraints, electron-counting constraints, atomic size constraints, ionic size constraints, atomic packing constraints, ionic packing constraints, heat of formation constraints, or entropy constraints.

24. (Currently Amended)   The computer program product of claim ~~2~~ 1, wherein:

at least one of the constraints includes one or more tolerance values representing an amount by which the corresponding constraint can be relaxed during generation of the experiment design.

25. (Currently Amended)   The computer program product of claim ~~2~~ 1, wherein the instructions operable to generate the experiment design include instructions operable to cause a programmable processor to:

identify a plurality of points in the hyperspace defined by the set of experimental parameters corresponding to candidate materials by counting through parameter space points defined by the sampling pattern and applying the experimental constraints to the parameter space points.

26. (Currently Amended)   The computer program product of claim ~~2~~ 1, wherein:

the set of experimental parameters includes at least four experimental parameters.

27. (Currently Amended)   The computer program product of claim ~~2~~ 1, wherein:

the set of experimental parameters includes at least six experimental parameters.

28. (Currently Amended)   The computer program product of claim 2 1, wherein:

      the set of experimental parameters includes at least ten experimental parameters.

29. (Currently Amended)   The computer program product of claim 2 1, wherein:

      the set of experimental parameters includes at least fifty experimental parameters.

30. (Currently Amended)   The computer program product of claim 2 1, wherein:

      the final set of experiments includes at least 48 experiments.

31. (Currently Amended)   The computer program product of claim 2 1, wherein:

      the final set of experiments includes at least 96 experiments.

32. (Currently Amended)   The computer program product of claim 2 1, wherein:

      the final set of experiments includes at least 1,000 experiments.

33. (Currently Amended)   The computer program product of claim 2 1, wherein:

      the final set of experiments includes at least 10,000 experiments.

34. (Currently Amended)   The computer program product of claim 2 1, wherein:

      the final set of experiments includes at least 50,000 experiments.

35. (Currently Amended)   The computer program product of claim 2 1, wherein:

      the final set of experiments includes at least 100,000 experiments.

36. (Currently Amended)   The computer program product of claim 6, wherein:

      each of the component materials has an associated set of material properties describing

the component material; and

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the instructions operable to cause a programmable processor to <u>receive input</u> <u>defining</u>~~define~~ the set of experimental parameters include instructions operable to cause a programmable processor to receive for each of the component materials a set of values for one or more of the material properties associated with the component material.

37. (Original) The computer program product of claim 36, wherein:

at least one of the material properties is selected from the group consisting of molecular weight, equivalents, density and concentration.

38. (Original) The computer program product of claim 36, wherein:

at least one of the material properties is a type describing a class of chemicals to be used in generating the experiment design.

39. (Currently Amended) A computer-implemented method for designing a set of experiments, comprising:

<u>receiving input</u> defining a set of experimental parameters, one or more sampling pattern defining a sampling for each parameter of the set of experimental parameters, and one or more constraints limiting the set of experiments to a particular volume or volumes of a hyperspace defined by the set of experimental parameters, at least a plurality of the set of parameters being grouped according to a parameter type such that the grouped parameters are constrained to perform a common role in the set of experiments;

generating a first estimate of the practicability of a <u>first</u> set of experiments defined by the parameters, the sampling patterns and the constraints, the first estimate including a count of the set of experiments defined by the set of experimental parameters, the <u>sampling patterns</u> ~~sets of~~ ~~values~~ and the constraints, and providing the first estimate to a user;

receiving ~~an~~ input <u>modifying at least one of the set of parameters, the sampling patterns</u> <u>or the constraints</u> in response to the first estimate;

in response to <u>the</u>~~an~~ input modifying at least one of the set of parameters, the sampling patterns or the constraints, generating a second estimate of the practicability of ~~the~~ <u>a second</u> set

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of experiments <u>defined by the parameters, the sampling patterns and the constraints, including</u> <u>the modified parameters, sampling patterns or constraints, the second estimate including a count</u> <u>of the second set of experiments,</u> and providing the second estimate to the user; and

in response to ~~an~~ input approving of the <u>second</u> estimate, generating an experiment design defined by the parameters, the sampling patterns and the constraints, the experiment design including <u>data representing</u> a final set of experiments<u>, the data including a plurality of sets</u> <u>of coordinates in the hyperspace defined by the set of experimental parameters, each of the sets</u> <u>of coordinates defining an experiment in the final set of experiments.</u>

40. (Currently Amended) The method of claim 39, ~~wherein:~~

~~the experiment design includes data representing a plurality of sets of coordinates in the~~ ~~hyperspace defined by the set of experimental parameters, each of the sets of coordinates~~ ~~defining an experiment in the final set of experiments, the method~~ further comprising: using the experiment design to synthesize one or more combinatorial libraries including a plurality of compositions defined by the coordinates of the experiment design.

41. (Currently Amended) The method of claim [[40]] <u>39</u>, wherein:

the sampling patterns include at least a first sampling pattern defined for a first parameter of the set of experimental parameters and a second sampling pattern defined for a second parameter of the set of experimental parameters, wherein the first sampling pattern is different from the second sampling pattern.

42. (Currently Amended) The method of claim [[40]] <u>39</u>, wherein:

the set of experimental parameters includes a plurality of component materials to be used in the set of experiments.

43. (Original) The method of claim 42, wherein:

the set of experimental parameters includes at least one process condition to be varied in the set of experiments.

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44. (Original) The method of claim 42, wherein:

the constraints include a mixture constraint limiting the fractional contribution of at least a plurality of the component materials to a total composition in one or more of the experiments in the set of experiments.

45. (Original) The method of claim 42, wherein:

the constraints include a type constraint limiting the total number of parameters of a specified type to be included in one or more of the experiments in the set of experiments.

46. (Original) The method of claim 42, wherein:

the constraints include a sum constraint limiting the sum of a contribution of parameters of a specified type to one or more of the experiments in the set of experiments.

47. (Original) The method of claim 42, wherein:

the constraints include a balance constraint limiting the contribution of at least one parameter to a plurality of experiments of the set of experiments based on the contribution of one or more other parameters to one or more of the experiments in the set of experiments.

48. (Original) The method of claim 42, wherein:

the constraints include a list constraint identifying a list of one or more starting compositions to be used to generate the set of experiments.

49. (Original) The method of claim 42, wherein:

the constraints include a synthesis constraint specifying an order in which a plurality of component materials are to be added in a synthesis to be performed in one or more of the experiments in the set of experiments.

50. (Original) The method of claim 49, wherein:

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the synthesis constraint specifies that the order in which component materials are to be added is to vary between a plurality of experiments in the set of experiments.

51. (Original) The method of claim 42, wherein:

the constraints include a process constraint specifying an order in which a plurality of process steps are to be performed in one or more of the experiments in the set of experiments.

52. (Original) The method of claim 51, wherein:

the process constraint specifies that the order in which process steps are to be performed is to vary between a plurality of experiments in the set of experiments.

53. (Currently Amended) The method of claim [[40]] 39, wherein:

the constraints include a project constraint specifying the order in which individual experiments in the set of experiments are to be performed.

54. (Currently Amended) The method of claim [[40]] 39, wherein:

at least one of the constraints includes one or more tolerance values representing an amount by which the corresponding constraint can be relaxed during generation of the experiment design.

55. (Currently Amended) The method of claim [[40]] 39, wherein:

generating the experiment design includes identifying a plurality of points in the hyperspace defined by the set of experimental parameters corresponding to candidate materials by counting through parameter space points defined by the sampling pattern and applying the experimental constraints to the parameter space points.

5656. (Currently Amended) The method of claim [[40]] 39, wherein:

the set of experimental parameters includes at least four experimental parameters.

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~~57~~ 57. (Currently Amended) The method of claim [[40]] 39, wherein:

the set of experimental parameters includes at least six experimental parameters.

58. (Currently Amended) The method of claim [[40]] 39, wherein:

the set of experimental parameters includes at least ten experimental parameters.

59. (Currently Amended) The method of claim [[40]] 39, wherein:

the set of experimental parameters includes at least fifty experimental parameters.

60. (Currently Amended) The method of claim [[40]] 39, wherein:

the final set of experiments includes at least 48 experiments.

61. (Currently Amended) The method of claim [[40]] 39, wherein:

the final set of experiments includes at least 96 experiments.

62. (Currently Amended) The method of claim [[40]] 39, wherein:

the final set of experiments includes at least 1,000 experiments.

63. (Currently Amended) The method of claim [[40]] 39, wherein:

the final set of experiments includes at least 10,000 experiments.

64. (Currently Amended) The method of claim [[40]] 39, wherein:

the final set of experiments includes at least 50,000 experiments.

65. (Currently Amended) The method of claim [[40]] 39, wherein:

the final set of experiments includes at least 100,000 experiments.

66. (Currently Amended) The method of claim 42, wherein:

each of the component materials has an associated set of material properties describing the component material; and

<u>receiving input</u> defining the set of experimental parameters includes receiving for each of the component materials a set of values for one or more of the material properties associated with the component material.

67. (Original) The method of claim 66, wherein:

at least one of the material properties is selected from the group consisting of molecular weight, equivalents, density and concentration.

68. (Original) The method of claim 66, wherein:

at least one of the material properties is a type describing a class of chemicals to be used in generating the experiment design.

69-89. (Cancelled).

90. (Currently Amended) A computer-implemented experiment design system, comprising:

means for defining a set of experimental parameters, one or more sampling patterns defining a sampling for each parameter of the set of experimental parameters, and one or more constraints limiting the set of experiments to a particular volume or volumes of a hyperspace defined by the set of experimental parameters, at least a plurality of the set of parameters being grouped according to a parameter type such that the grouped parameters are constrained to perform a common role in the set of experiments;

means for generating an estimate of the practicability of a set of experiments defined by the parameters, the sampling patterns and the constraints, the ~~first~~ estimate including a count of the set of experiments defined by the set of experimental parameters, the <u>sampling patterns</u>~~sets of values~~ and the constraints;

means for generating, in response to a user input approving of the estimate, an experiment design defined by the parameters, the sampling patterns and the constraints, the experiment design including <u>data representing</u> a final set of experiments<u>, the data including a</u>

plurality of sets of coordinates in the hyperspace defined by the set of experimental parameters, each of the sets of coordinates defining an experiment in the final set of experiments.

91. (Currently Amended)   The experiment design system of claim 90, ~~wherein:~~

~~the experiment design includes data representing a plurality of sets of coordinates in the hyperspace defined by the set of experimental parameters, each of the sets of coordinates defining an experiment in the final set of experiments, the system~~ further comprising:
means for synthesizing based on the experiment design one or more combinatorial libraries including a plurality of compositions defined by the coordinates of the experiment design.

92. (Original) The experiment design system of claim 91, wherein:

the set of experimental parameters includes at least ten experimental parameters.

93. (Original) The experiment design system of claim 91, wherein:

the final set of experiments includes at least 1,000 experiments.

94. (Currently Amended)   A computer program product on a computer-readable medium for designing a set of experiments, the program comprising instructions operable to cause a programmable processor to:

~~define~~ receive input defining a set of experimental parameters, one or more sampling patterns defining a sampling of each parameter of the set of experimental parameters, and one or more constraints limiting the set of experiments to a particular volume or volumes of a hyperspace defined by the set of experimental parameters, at least a plurality of the set of parameters being mixture parameters defining a plurality of component materials to be used in the set of experiments to generate a mixture, the sampling patterns defined for the mixture parameters defining a non-uniform sampling of the mixture parameters; and

generate an experiment design defined by the parameters, the sampling patterns and the constraints, the experiment design including data representing a final set of experiments, the data

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<u>including a plurality of sets of coordinates in the hyperspace defined by the set of experimental</u>

<u>parameters, each of the sets of coordinates defining an experiment in the final set of experiments.</u>

95. (Cancelled)

96. (Currently Amended)   A computer program product on a computer-readable medium for

designing a set of experiments, the program comprising instructions operable to cause a

programmable processor to:

~~define~~ <u>receive input defining</u> a set of experimental parameters, one or more sampling

patterns defining a sampling of each parameter of the set of experimental parameters, and one or

more constraints limiting the set of experiments to a particular volume or volumes of a

hyperspace defined by the set of experimental parameters, at least a plurality of the set of

parameters being mixture parameters defining a plurality of component materials to be used in

the set of experiments to generate a mixture, the constraints including a mixture constraint

limiting the fractional contribution of at least a plurality of the component materials to a total

composition in one or more of the experiments in the set of experiments, the mixture constraint

including one or more tolerance values representing an amount by which the mixture constraint

can be relaxed during generation of an experiment design; and

generate an experiment design defined by the parameters, the sampling patterns and the

constraints, the experiment design including <u>data representing</u> a final set of experiments<u>, the data</u>

<u>including a plurality of sets of coordinates in the hyperspace defined by the set of experimental</u>

<u>parameters, each of the sets of coordinates defining an experiment in the final set of experiments.</u>

97. (Cancelled).

98. (Currently Amended)   A computer program product on a computer-readable medium for

designing a set of experiments, the program comprising instructions operable to cause a

programmable processor to:

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~~define~~ <u>receive input defining</u> a set of experimental parameters, one or more sampling patterns defining a sampling of each parameter of the set of experimental parameters, and one or more constraints limiting the set of experiments to a particular volume or volumes of a hyperspace defined by the set of experimental parameters, at least a plurality of the set of parameters being mixture parameters defining a plurality of component materials to be used in the set of experiments to generate a mixture, the constraints including a balance constraint limiting the contribution of at least one of the mixture parameters to the experiment design based on the contribution of a plurality of other mixture parameters to one or more of the experiments in the set of experiments; and

generate an experiment design defined by the parameters, the sampling patterns and the constraints, the experiment design including <u>data representing</u> a final set of experiments, <u>the data including a plurality of sets of coordinates in the hyperspace defined by the set of experimental parameters, each of the sets of coordinates defining an experiment in the final set of experiments.</u>

99-100. (Cancelled).